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REFINING OF EDIBLE OIL

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(56) Prior Art Documents  
AU 55192/86 C11B 3/14

(57) The process according to the invention is applicable to palm oil, hybrid palm oil, and palm oil products such as palm olein and palm stearin, in each case either crude or degummed and/or bleached

#### CLAIM

1. A process for the refining of edible oil substantially without destroying the carotenes present in the oil which comprises the step of subjecting the oil to a pressure of less than 0.060 Torr and a temperature of less than 200 degree Celsius.

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PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

632272

Wc

Palm Oil Research Institute of Malaysia,  
No. 6, Persiaran Institusi,  
Bandar Baru Bangi,  
43000 Kajang,  
Selangor,  
Malaysia

hereby apply for the grant of a Standard Patent for an invention entitled:

"REFINING OF EDIBLE OIL"

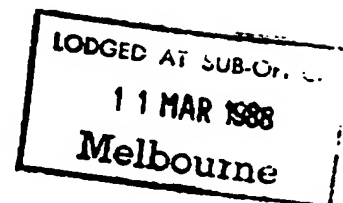
which is described in the accompanying provisional  
~~complete~~ specification.

Details of basic application(s):—

Number

Convention Country

Date



The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

Dated this

11

day of

March

19 88

*H. v. Rimington*

To: THE COMMISSIONER OF PATENTS

(a member of the firm of DAVIES & COLLISON for and on behalf of the Applicant).

Davies & Collison, Melbourne and Canberra.

( COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

DECLARATION IN SUPPORT OF CONVENTION OR  
NON-CONVENTION APPLICATION FOR A PATENT

Insert title of invention

In support of the Application made for a patent for an invention  
entitled: "REFINING OF EDIBLE OIL"

Insert full name(s) and address(es)  
of declarant(s) being the appli-  
cant(s) or person(s) authorized to  
sign on behalf of an applicant  
company

~~I~~ WE AUGUSTINE ONG SOON HOCK

PALM OIL RESEARCH INSTITUTE OF MALAYSIA  
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Baru Bangi, 43000 Kajang, Selangor,  
Malaysia

Cross out whichever of paragraphs  
1(a) or 1(b) does not apply

1(a) relates to application made  
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1(b) relates to application made  
by company, insert name of  
applicant company

do solemnly and sincerely declare as follows -

~~I am~~ I am the applicant for the patent  
~~We are~~  
or (b) I am authorized by

PALM OIL RESEARCH INSTITUTE OF MALAYSIA

Cross out whichever of paragraphs  
2(a) or 2(b) does not apply

2(a) relates to application made  
by inventor(s)  
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tors

the applicant for the patent to make this declaration on <sup>its</sup> behalf  
~~their~~

~~I am~~ I am the actual inventor S of the invention  
~~We are~~  
or (b)

Ooi, Cheng Keat  
Choo Yuen May  
Augustine Ong Soon Hock  
all of No. 6, Persiaran Institusi,  
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43000 Kajang  
Selangor Darul Ehsan

~~are~~ the actual inventor S of the invention and the facts upon which the applicant  
~~is~~ entitled to make the application are as follows -

State manner in which applicant(s)  
derive title from inventor(s)

The applicant would, on the grant of a patent  
for the invention to the aforesaid inventors,  
be entitled to have the patent assigned to it.

Cross out paragraphs 3 and 4  
for non-convention applications.  
For convention applications,  
insert basic country(s) followed  
by date(s) and basic applicant(s)

~~3~~ ~~The basic application~~ as defined by Section 141 of the Act <sup>was</sup> made  
in on the  
by on the  
in on the  
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in on the  
by


4 The basic application referred to in paragraph 3 of this Declaration <sup>was</sup>  
the first application made in a Convention country in respect of the invention the subject  
~~of the application~~

Insert place and date of signature

Declared at Selangor this 20th day of March, 1989

Signature of declarant(s) (no  
attestation required)

Note Initial all alterations

  
DATUK PROF. AUGUSTINE S.H. ONG  
Director-General, PORIM

DAVIES & COLLISON, MELBOURNE and CANBERRA

C O M M O N W E A L T H O F A U S T R A L I A

PATENTS ACT 1952

COMPLETE SPECIFICATION

(Original)

FOR OFFICE USE

632272

Class

Int. Class

Application Number:  
Lodged:

Complete Specification Lodged:  
Accepted:  
Published:

Priority:

Related Art:

Name of Applicant:

PALM OIL RESEARCH INSTITUTE OF MALAYSIA

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Complete specification for the invention entitled:

MOO7194 07/03/89

"REFINING OF EDIBLE OIL"

The following statement is a full description of this invention,  
including the best method of performing it known to us :-

"REFINING OF EDIBLE OIL"

Field of Invention

This invention relates to the process of refining edible oil and has particular but not exclusive application to the process of refining palm oil.

Background Art

Palm oil is derived from the mesocarp of the oil palm fruits. Its orange red colour is due to the presence of carotenoids, a class of C40 polyunsaturated hydrocarbons. The carotenes are known to possess provitamin A properties and recent findings have shown that  $\beta$ -carotene also inhibits tumour progression and hence reduces cancer formation. Commercial crude palm oil contains

500-700 ppm of carotenes of which  $\alpha$ - and  $\beta$ -carotenes form 90% of the total carotenes. However there are other species of oil palm fruits which can produce crude palm oil with carotene concentrations from 1000-3000 ppm.

Most of the palm oil used is in the refined, bleached and deodorised form. This refined, bleached and deodorised (RBD) palm oil is mainly produced by refining the crude palm oil through the physical refining process. This refining process involves degumming the oil at about 90°C with 0.1% phosphoric acid followed by bleaching the oil with about 1-2% bleaching earth at about 105°C. The oil is then filtered. The phosphoric acid is used to reduce the gums and together with the bleaching earth significantly reduces impurities, hydroperoxides and phosphatides of the oil. The oil after this stage is called degummed and bleached oil. This degummed and bleached palm oil is still orange red in colour although the carotene content has been reduced. The degummed and bleached oil is then passed through a steam deodoriser at a temperature of 240-260°C and a pressure of 1-3 Torr. At this stage the free fatty acids in the oil are distilled over, and the carotenes are destroyed while the oil is being deodorised. The oil after this stage normally has a free fatty acid (FFA) content of less than 0.1%, carotene content of less than 20 ppm and colour of less than 3 red (Lovibond Scale). this oil is called Refined, Bleached and Deodorised (RBD) Palm Oil.

### Summary of the Invention

The present invention provides a process for the refining of palm oil and its products without destroying the carotenes present in the oil.

The invention accordingly provides a process for the refining of edible oil substantially without destroying the carotenes present in the oil which comprises the step of subjecting the oil to a pressure of less than 0.060 Torr and a temperature of less than 200°C.

The temperature is preferably in the range 100 to 200°C. The pressure is preferably in the range 0.003 to 0.060 Torr.

According to a preferred embodiment of the invention palm oil or a product of palm oil is passed through a deodoriser, preferably at a temperature in the range 100-200°C and at a pressure in the range 0.003-0.060 Torr. The oil used can be crude palm oil, or palm oil in the degummed and bleached form, or in a less refined form. During this process the free fatty acids are distilled over and the oil deodorised, but the carotenes are not destroyed. The oil after this stage, that is the refined and deodorised red palm oil, is still orange red in colour and has a free fatty acid content of less than 0.12%, carotene content and peroxide value almost the same as before the process, and a bland smell.

Preferably, the oil is heated to the required temperature and then allowed to pass through a distillation column where the temperature of the oil is maintained and the required pressure is created. The free fatty acids that are distilled

over are collected in a separate container from the final product, that is the refined and deodorised red palm oil.

The process according to the invention is applicable to palm oil, hybrid palm oil, and palm oil products such as palm olein and palm stearin, in each case either crude or degummed and/or bleached

The present invention will now be illustrated by the following examples.

#### Example 1

Crude palm oil was heated to a temperature of 150°C. The oil was then allowed to pass through a deodoriser comprising a vacuum distillation column (molecular distillator) at a rate of 24 gram per hour and at a pressure of 0.023 Torr. The temperature of the column was maintained at 150°C. The refined and deodorised red palm oil was found to have the characteristics shown in Table 1.

Table 1.

	FFA(%)	Carotene Content(ppm)
Crude Palm Oil	2.70	563
Refined and Deodorised Red Palm Oil	0.09	603



## Example 2

Crude palm oil was heated to a temperature of 170°C. The oil was then allowed to pass through a vacuum distillation column (molecular distillator) at a rate of 50 gram per hour and at a pressure of 0.027 - 0.030 Torr. The temperature of the column was maintained at 170°C. The refined and deodorised red palm oil was found to have the characteristics shown in Table 2.

Table 2

	FFA(%)	Carotene Content(ppm)
Crude Palm Oil	2.70	563
Refined and Deodorised Red Palm Oil	0.09	532

## Example 3

Crude palm oil was heated to a temperature of 150°C. The oil was then allowed to pass through a vacuum distillation column (molecular distillator) at a rate of 25 gram per hour and at a pressure of 0.040 - 0.045 Torr. The temperature of the column was maintained at 150°C. The refined and deodorised red palm oil was found to have the characteristics shown in Table 3.

Table 3

	FFA(%)	Carotene Content(ppm)
Crude Palm Oil	2.70	563
Refined and Deodorised Red Palm Oil	0.09	568

Example 4

Degummed and bleached palm oil was heated to a temperature of 150°C. The oil was then allowed to pass through a vacuum distillation column (molecular distillator) at a rate of 10 litre per hour and at a pressure of 0.003 Torr. The temperature of the column was maintained at 150°C. The refined and deodorised red palm oil was found to have the characteristics shown in Table 4.

Table 4

	FFA(%)	Carotene Content(ppm)
Degummed and Bleached Palm Oil	2.70	347
Refined and Deodorised Red Palm Oil	0.50	352

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A process for the refining of edible oil substantially without destroying the carotenes present in the oil which comprises the step of subjecting the oil to a pressure of less than 0.060 Torr and a temperature of less than 200 degree Celsius.
2. A process as claimed in Claim 1, wherein the oil is degummed and bleached oil.
3. A process as claimed in Claim 1, wherein the oil is degummed and bleached palm oil.
4. A process as claimed in Claim 1, wherein the oil is degummed and bleached palm olein.
5. A process as claimed in Claim 1, wherein the oil is degummed and bleached palm stearin.
6. A process as claimed in Claim 1, wherein the oil is crude palm oil.
7. A process as claimed in Claim 1, wherein the oil is hybrid palm oil.
8. A process as claimed in Claim 1, wherein the oil is crude palm olein.
9. A process as claimed in Claim 1, wherein the oil is crude palm stearin.

10. A process as claimed in Claim 1 and substantially as herein before described in any one of the examples.

11. A process as claimed in any one of the preceding Claims, wherein the process is carried out at a temperature range of 100 to 200 degree Celsius.

12. A process as claimed in any one of the preceding Claims, wherein the process is carried out at a pressure of 0.003 to 0.060 Torr.

~~13. The steps or features disclosed herein or any combination thereof.~~

DATED this 7th day of March 1989

PALM OIL RESEARCH INSTITUTE OF MALAYSIA

By its Patent Attorneys:

DAVIES & COLLISON

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